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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/556,651

01/27/2006

Hideyoshi Horimai

211A 3789 PCT

6539

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7590

06/15/2009

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EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

06/15/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/556,651	Applicant(s) HORIMAI, HIDEYOSHI	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 14-25 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 14-25 and 27-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on March 9, 2009 which has been entered into the file.
- By this amendment, the applicant has amended claims 1, 3, 6, 7, 10, 14, 16, 17, 18, 19, 21, 22, 23, 25, and 27-30 and has canceled claims 12-13 and 26.
- Claims 1-11, 14-25 and 27-30 remain pending in this application.
- The objection to claims 29 and 30 are withdrawn in response to applicant's amendment.
- The objections to the claims are withdrawn in response to applicant's amendment.
- The rejections of claims 17-28 under 35 USC 112, first paragraph set forth in the previous Office Action are withdrawn in response to applicant's amendment.

Response to Amendment

1. The amendment filed March 9, 2009 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the amended claims 1, 7, 17, 22, recite the phrase "the traveling direction of said reference light is directed in a direction other than the optical axis direction of the optical system". The specification simply fails to support for this since the reference beam has to be traveling in the direction of the optical system, (assumed to be the objective lens), in order for one of the reference light beam and the object light beam to surround the other.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

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pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1, 4-6, 7, 14-16, 17, 20-21, 22, 27-30 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the section "response to amendment" above.

4. **Claims 1, 4-6, 7, 14-16, 17, 20-21, 22 and 27-30 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1, 7, 17, 22 have been amended to recite the phrase "the traveling direction of said reference light is directed in a direction other than the optical axis direction of the optical system". The specification fails to teach if the reference light beam is traveling at direction different from the optical system, (assumed to be the objective lens), how one of the reference light and object light is capable of surround the other?

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. **Claims 1, 4-6, 7, 14-16, 17, 19, 20-21, 22 and 27-30 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1, 7, 17, 22 have been amended to recite the phrase "the traveling direction of said reference light is directed in a direction other than the optical axis direction of the optical system". The phrase is confusing since it is not clear what is considered to be the "optical system", since it lacks proper antecedent basis. Also the reference beam is shown in all Figures to be traveling parallel in the direction parallel to the optical axis direction of the objective lens. So it is not clear what does the phrase mean. This phrase is being examined in the broadest interpretation as "the reference light does not travel on the optical axis of the objective lens". The applicant is respectfully requested to clarify the claim language.

Claim 19 has been amended to include the phrase "said second spatial light modulator" that is confusing since it lacks proper antecedent basis from earlier part of the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 1-6, 7-11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Orlov et al (PN. 6,108,110) in view of the patent issued to Heanue et al (PN. 5,940,514).**

Claims 1, 3, and 7 have been amended that necessitate new grounds of rejection.

Orlov et al teaches a *holographic storage and retrieval system* that is comprised of a *first* spatial light modulator (12, Figures 1-2) for spatial modulating a light from a source (16) and generating an *information light* or *signal light* (18), and a *reference generator* (28) for spatial modulating a light from a source (16) and generating a *reference light* (32). The signal or information light (18) and the reference

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light (32) are directed to an *object lens* (38) with the area of the reference light, at the entrance of the object lens, surrounds the area of the signal or information light. The reference light and the information or signal light intersects and interferes with each other at a location of a holographic disc or *information recording* layer (40) to record the interference pattern as a hologram, (please see column 4, line 19 to column 5, line 10).

It is implicitly true that the spatial light modulator (12) for modulating the information or signal light implicitly has a plurality pixels. This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the reference generator (28), disposed at the periphery of the first spatial light modulator (12), comprises also a spatial light modulator. Orlov et al teaches that the reference generator (28) may include diffuser, lenses, phase plate or optical system (please see column 4, line 43, 49-51). Heanue et al in the same field of endeavor teaches that a diffuser or phase plate may be provided by *spatial light modulator* (PSLM, please see column 4, line 18, column 9, lines 1-10). It would then have been obvious to one skilled in the art to use spatial light modulator as an alternative means to provide phase modulation or diffusing function as the phase plate or diffuser (i.e. the reference generator) for the benefit of using known means to provide the phase modulation and in addition to use spatial light modulator that allows the change and control of the phase modulation.

Claims 1 and 7 have been amended to include the phrase "the reference light is directed in a direction other than the optical axis direction of the optical system". This phrase is rejected under 35 USC 112, first and second paragraphs for the reasons stated above. As shown in Figure 1 and 2 of Orlov et al, reference light is traveling on the peripheral portion of the signal light (8), since the signal light is traveling on the optical axis of the object lens (38) this means the reference light is not traveling on the optical axis of the objective lens or the optical system.

Claim 3 has been amended to include the phrase "said reference light is spatially modulated by said second spatial light modulator such that said reference light area on the entrance pupil surface of the

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said object lens is formed asymmetrical to a virtual center point of said reference light area". Orlov et al teaches that the reference generator can impart a speckle pattern to the reference beam which implicitly means the reference light has an asymmetric light pattern with respect to the virtual center of the reference beam area, (please see column 4, lines 41-45).

With regard to claim 4-6, Orlov et al teaches that the first spatial light modulator (12, Figures 1-2) and the reference generator (28) are disposed at the same plane (22). Heanue et al teaches that the reference generator (such as phase plate or diffuser) may also be provided by spatial light modulator. This means one skilled in the art would have been motivated to make the reference generator and the first spatial light modulator with a single spatial light modulator with the peripheral regions provide the phase modulator or phase plate to generate the reference light and the central regions provide information modulation to provide the information or signal light for the benefit of using a single element to achieve both functions. With regard to claim 5, it is implicitly true that the spatial light modulator has a plurality of pixels that are capable of modulate the intensity, phases of the light. With regard to **amended** claim 6, since the reference light is traveling in a direction different from the axis of the optical system, this means the modulation to the reference beam has to be cyclic the same way as the instant application.

With regard to claims 7-10, the method for recording the hologram is implicitly included in the disclosure of the recording system and is rejected with respect to Orlov et al in combination with Heanue et al for the same reasons as stated for claims 1-3 above. Orlov et al teaches that the reference generator (28) may include various optical elements that are adapted to provide shift speckle multiplexing, (please see column 4, lines 45-46). This means the reference light is radially generated that includes certain radial patterns. **With regard to claim 9**, the radially distributed reference lights have a virtual center coincide with the center of the information or signal light. **With regard to claim 10**, Orlov et al teaches that the plurality of the reference lights generated by the reference generator can be adapted to provide shift speckle multiplexing. The shift speckle multiplexing involves using different phase-modulated

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reference light to record multiple holograms at different or overlapped recording locations. Although this reference does not teach explicitly about changing the virtual center angle between the plurality of the radial patterns, but if this changing of angles are referred to angular multiplexing scheme, then one skilled in the art must understand that the angular multiplexing scheme is well known in the art for the benefit of providing multiple recording.

With regard to claim 11, the method for recording the hologram is implicitly included in the disclosure of the recording system and is rejected with respect to Orlov et al in combination with Heanue et al for the same reasons as stated for claims 1-3 above. Orlov et al teaches that the reference light generator can include various optical elements, and it could include speckle pattern, (please see column 4, lines 41-45) which means the reference lights can be provided with various patterns including asymmetric pattern.

With regard to claims 14-16, Orlov et al teaches that the first spatial light modulator (12, Figures 1-2) and the reference generator (28) are disposed at the same plane (22). Heanue et al teaches that the reference generator (such as phase plate or diffuser) may also be provided by spatial light modulator. This means one skilled in the art would have been motivated to make the reference generator and the first spatial light modulator with a single spatial light modulator with the peripheral regions provide the phase modulator or phase plate to generate the reference light and the central regions provide information modulation to provide the information or signal light for the benefit of using a single element to achieve both functions. With regard to claim 15, it is implicitly true that the spatial light modulator has a plurality of pixels that are capable of modulate the intensity, phases of the light. With regard to amended claim 16, the reference light taught by Orlov et al is deflected so that the traveling in direction that is different from the optical axis, the imparted modulation therefore has a cyclic pattern the same way as the instant application.

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9. Claims 17-25, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Orlov et al (PN. 6,108,110) in view of the patent issued to Heanue et al (PN. 5,940,514).

Claims 17-19, 22-23 and 25 have been significantly amended that necessitate the new grounds of rejection.

With regard to **amended** claims 17-19, **Orlov** et al teaches a *holographic storage and retrieval system* that is comprised of a *first* spatial light modulator (202, Figure 6) for spatial modulating a coherent light beam (210) from a *light source* and generating an *information* light or *signal light* (212), and a *reference generator* (214) for spatial modulating a coherent light (218) from the same light source as for the signal light beam and generating a *reference* light (220). The signal or information light (212) and the reference light (220) are directed to a hologram medium (204) for recording, in the recording mode, an interference pattern as hologram in the medium. In the retrieving mode, the coherent light (218) is modulated by the reference generator (214) to generate a reproducing reference light (220) that passes through an objective lens (216) onto the hologram recording medium (204) where the recorded interference pattern generates a reconstructed light beam (226) that serves as the return beam returned from the medium through the object lens to a detector (222) for detecting reconstructed signal information. Orlov et al teaches explicitly that the area of the reproducing reference light (220) on the entrance pupil of the object beam surrounds the area of the reconstructed light beam (226) from the medium, (please see column 8, line 41 to column 9, line 34). Noted since the *reconstructed* signal or information light is detected in the central region (222) of the reference beam generator, this means the area of the reference light on the object lens is surrounding the area of the signal or information light on the object lens.

It is implicitly true that the spatial light modulator (202) for modulating the information or signal light implicitly has a plurality pixels. This reference has met all the limitations of the claims with the

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exception that it does not teach explicitly that the reference generator (214) comprises a spatial light modulator. Orlov et al teaches that the reference generator (28) may include diffuser, lenses, phase plate or optical system (please see column 4, line 43, 49-51). **Heanue** et al in the same field of endeavor teaches that a diffuser or phase plate may be provided by *spatial light modulator* (PSLM, please see column 4, line 18, column 9, lines 1-10). It would then have been obvious to one skilled in the art to use spatial light modulator as an alternative means to provide phase modulation or diffusing function as the phase plate or diffuser (i.e. the reference generator) for the benefit of using known means to provide the phase modulation and in addition to use spatial light modulator that allows the change and control of the phase modulation.

Claims 17 and 22 have been amended to include the phrase “the reference light is directed in a direction other than the optical axis direction of the optical system”. This phrase is rejected under 35 USC 112, first and second paragraphs for the reasons stated above. As shown in Figure 6, of Orlov et al, the reference light is traveling on the peripheral portion of the signal light (212/226), since the signal light is traveling on the optical axis of the object lens (2126) this means the reference light is not traveling on the optical axis of the objective lens or the optical system.

Claim 19 has been amended to include the phrase “said reference light is spatially modulated by said second spatial light modulator such that said reference light area on the entrance pupil surface of the said object lens is formed asymmetrical to a virtual center point of said reference light area”. Orlov et al teaches that the reference generator can impart a speckle pattern to the reference beam which implicitly means the reference light has an asymmetric light pattern with respect to the virtual center of the reference beam area, (please see column 4, lines 41-45).

With regard to claims 20-21, it is implicitly true that the spatial light modulator comprise a plurality of pixels. With regard to amended claim 21, Orlov et al teaches reference light is deflected so

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that the traveling direction is different from the optical axis, the imparted modulation therefore must have cyclic pattern the same way as the instant application.

With regard to claims 22-26, the method for generating reconstructed signal light is implicitly included in the disclosures of the retrieval arrangement of Orlov et al in combination with the teachings of Heanue et al as stated in claims 17-19 above. With regard to claim 24, the center of the area of the reference light and the virtual center of the plurality of reference light are optical axes of the optical storage and retrieval system. With regard to claim 25, Orlov et al teaches that the reference light generator may include variety of optical elements, in particular it may include speckle pattern, which therefore can have asymmetric pattern.

With regard to claim 27, the reference generator taught by Orlov et al in combination with the teachings of Heanue et al teaches that the intensity and phase of the reference light are spatially modulated.

With regard to claim 28, the traveling direction of the reference light deflected in a direction other than the optical axis direction the same way as the instant application, this means the imparted modulation to the reference beam must have cyclic pattern the same way as the instant application.

10. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Orlov et al and Heanue et al as applied to claims 1-3 and 17-19 above, and further in view of the Patent Application Publication by Horimai (UA 2002/0063342 A1).

The holographic recording and reproducing apparatus and method taught by Orlov et al in combination with the teachings of Heanue et al as described for claims 1-3 and 17-19 above have met all the limitations of the claims.

These references however do not teach to include a servo detection system. However it is rather well known in the art to use servo detection system for detecting servo tracking information. Horimai et

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al in the same field of endeavor teaches to include address servo areas in the hologram recording medium wherein the servo information can be retrieved by using a light source for generating servo light and a servo signal is detected by detector and servo information acquisition means, (please see Figure 4 and paragraphs [0135], [0136]). It would then have been obvious to one skilled in the art to apply the teachings of Horimai et al to add a servo detection mechanism to the hologram recording and retrieving apparatus for the benefit of allowing servo address information can be implemented in the holographic memory to add the data detection.

Response to Arguments

11. Applicant's arguments filed on March 9, 2009 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and have been rejected for the reasons stated above. The applicant is respectfully reminded, although the speckle pattern is the result of the interference of scattered reference beams, the speckle pattern is still a *random intensity pattern* of the reference beams, which therefore imparts an asymmetric area (i.e. random pattern) on entrance pupil of the object beam.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.

***/Audrey Y. Chang/
Primary Examiner, Art Unit 2872***